

## WHAT IS CLAIMED IS:

1. A simple and efficient process for the preparation of pencil lead from the spent or waste pot liners of aluminum industries, said process comprising steps of:
  - a. collecting spent or waste spent pot liners,
  - b. crushing the liners into various sizes ranging between 1/2 inch to -125 micron,
  - c. adding chromic acid to the crushed liners for time duration ranging between 20-40 minutes at temperature ranging between 130-140°C to obtain the reacted product,
  - d. washing the reacted product with distilled water multiple times till the filtrated solid mass is neutral,
  - e. drying the neutral solid mass at temperature ranging between 80-120°C for about 1 hour,
  - f. thermally shock-treating the dried mass for about 1-3 minutes in pre heated furnace kept at temperature ranging between 900-980°C to obtain a fine flowing graphite powder,
  - g. mixing the powder with binder(s),
  - h. moistening the mixture with requisite amount of water to form a stiff dough,
  - i. extruding the dough under pressure to obtain product in the form of a discs,
  - j. drying the discs to the moisture content of less than 10%,
  - k. heating the dried discs in an inert/reducing atmosphere in a furnace at temperature ranging between 400-1200°C for time duration ranging between 1 to 6 hours,
  - l. cooling the heated discs to room temperature in about 20-50 hours, and
  - m. obtaining the pencil lead.
2. The process as claimed in claim 1, wherein the spent or waste pot liners are cathode blocks.
3. The process as claimed in claim 1, wherein the binders are selected from a group comprising bentonite clay, china clay, local plastic clay with added phosphoric acid, and kaoline clay.

4. The process as claimed in claim 1, wherein the ratio of graphite powder to binder is ranging between 4:1 to 2:3.
5. The process as claimed in claim 1, wherein the ratio of binders is ranging between 3:0.5 to 1:1.
6. The process as claimed in claim 1, wherein the chromic acid is added drop-wise.
7. The process as claimed in claim 1, wherein the chromic acid is added under constant stirring.
8. The process as claimed in claim 1, wherein the graphite powder is of crystalline size of about 20 micrometers.
9. The process as claimed in claim 1, wherein the graphite powder has ash content of about 15%.
10. The process as claimed in claim 1, wherein the pressure is ranging between 50-200 Kg/cm<sup>2</sup>.
11. The process as claimed in claim 1, wherein the disc is dried under the shade.
12. The process as claimed in claim 1, wherein the room temperature is ranging between 24 to 30°C.
13. The process as claimed in claim 1, wherein the pencil lead shows transverse strength ranging between 200 to 300kg/cm.
14. The pencil lead obtained from the spent or waste pot liners by the process of claim 1.
15. The pencil lead as claimed in claim 14, wherein the lead has ash content of about 15%.